

What is claimed is:

[Claim 1] An object operable for communicating wireless radio frequency (RF) signals, said object comprising an antenna integrated (for example, embedded) therewith.

[Claim 2] An object as set forth in Claim 1, said integrated antenna being embedded into said object (e.g. a CD/compact disk; a ULD (Unit Load Device), meat tray or other receptacle).

[Claim 3] An object as set forth in Claim 1, said integrated antenna having a dimension thereof that is substantially as large as a dimension of said object.

[Claim 4] An object as set forth in Claim 1, said RF signals having a frequency not exceeding 15 megahertz.

[Claim 5] An object as set forth in Claim 1, said object comprising a product (e.g. stent) and an RFID tag attached thereto (e.g. integrated therewith), said RFID tag comprising a transmitter and a (preferably much smaller than the integrated antenna) tag antenna operable to transmit wireless RF signals to said integrated antenna.

[Claim 6] An object as set forth in Claim 1, said object comprising a receptacle and an RFID tag attached thereto (e.g. integrated therewith), said RFID tag comprising a transmitter and a (smaller) tag antenna operable to transmit wireless RF signals to said integrated antenna.

[Claim 7] An object as set forth in Claim 5, said RFID tag being passive and further comprising a receiver, a microprocessor, a data storage device operable to store a selected code (e.g. an ID code to identify said object or said product), said tag antenna being operable to receive incoming wireless RF signals from said integrated antenna and to communicate them to said receiver, said receiver being operable to communicate them to

said ID code) from said data storage device in response to a selected set of said incoming wireless RF signals and to transmit said selected code wirelessly from said tag antenna to said integrated antenna, said integrated antenna being operable thereupon to transmit said ID code wirelessly to a field antenna.

[Claim 8] An object as set forth in Claim 5, said RFID tag being active and further comprising a microprocessor, a data storage device operable to store a selected code (e.g. an ID code to identify said object or said product), said object comprising a display for displaying said selected code upon a signal from said microprocessor and an energy storage device (e.g. a lithium ion battery, operable to energize said microprocessor, said display, and said transmitter).

[Claim 9] An object as set forth in Claim 6, said receptacle being operable to hold a product, said receptacle comprising a sensor operable to generate a signal characteristic of a condition (e.g. temperature, jog, etc.) experienced by said product.

[Claim 10] An object as set forth in Claim 1, said object comprising an RFID tag embedded therein.

[Claim 11] An object as set forth in Claim 4, wherein said embedded antenna comprises a ferrite loop.

[Claim 12] An object as set forth in Claim 1, wherein said object comprises a produce (e.g. a cd/compact disk, stent, pill bottle).

[Claim 13] An object as set forth in Claim 1, wherein said object comprises a receptacle (e.g. a tray for holding meat), said receptacle being operable to receive and hold a product (e.g. a steak, a stent), said product having an RFID tag attached thereto and being operable for communicating said wireless radio signals between said product and said integrated antenna in said receptacle.

[Claim 14] An object as set forth in Claim 4, said wireless RF signals having a frequency not exceeding 1 MHz.

[Claim 15] An object as set forth in Claim 1, said integrated antenna comprising a loop integrated into said object in each of two substantially orthogonal dimensions thereof.

[Claim 16] A receptacle comprising:

a body portion operable to hold a product,

an RFID tag attached to said body portion, said RFID tag comprising a receiver, a

transmitter, and an antenna, said antenna being integrated into a unitary relationship with said body portion.

[Claim 17] A receptacle as set forth in Claim 16, said RFID tag being operable to receive and transmit wirelessly at a frequency not exceeding 1 megahertz.

[Claim 18] A receptacle as set forth in Claim 17, said frequency not exceeding 300 kilohertz.

[Claim 19] A receptacle as set forth in Claim 18, said antenna being a loop antenna designed for superior strength of signal reception by having dimensions thereof scaled to dimensions of said body portion.

[Claim 20] A receptacle as set forth in Claim 19, said loop antenna having a dimension thereof that is substantially as large as to a maximum dimension of said receptacle.

[Claim 21] A receptacle as set forth in Claim 20, said loop antenna comprising a loop integrated into said receptacle in each of two substantially orthogonal dimensions thereof.

[Claim 22] A receptacle as set forth in Claim 18, said receptacle comprising a container operable to enclose said product, said container further comprising a sensor disposed on a surface of said container and operable to generate a sealing signal indicating sealing of said container upon shrink-wrapping thereof.

[Claim 23] A receptacle as set forth in Claim 18, said receptacle comprising a container operable to enclose said product, said RFID tag further comprising a sensor disposed within said container and operable to generate a signal characteristic of a condition experienced by said product.

[Claim 24] A receptacle as set forth in Claim 20, said environmental condition being selected from temperature, light exposure, weight, humidity, and shock impulse (Gog).

[Claim 25] A receptacle as set forth in Claim 20, said RFID tag further comprising an indicator element for indicating impending expiry of viability of said product.

[Claim 26] A receptacle as set forth in Claim 25, said indicator element being operable to provide a signal selected from visible light and audible sound.

[Claim 27] A receptacle as set forth in Claim 26, said indicator element being an LCD display.

[Claim 28] A receptacle as set forth in Claim 26, said indicator element being a blinking lamp.

[Claim 29] A receptacle as set forth in Claim 18, said RFID tag further comprising an indicator element for indicating impending expiry of viability of said product.

[Claim 30] A receptacle as set forth in Claim 18, said receptacle further comprising an indicator element operable for indicating a condition selected from a) impending expiry of viability of said product and b) sealing of said receptacle.

[Claim 31] A receptacle as set forth in Claim 30, said receptacle comprising a sensor disposed on a surface of said receptacle and operable to generate a sealing signal indicating sealing of said receptacle upon shrink-wrapping thereof.

[Claim 32] A receptacle as set forth in Claim-22, said receptacle comprising a stackable container which is adapted for stacking upon other stackable containers to expose a surface

an indicator element disposed on said surface and operable for indicating a condition selected from a) temperature of said product, b) sealing of said receptacle, c) light exposure within said stackable container, d) weight of said product, e) humidity within said stackable container, f) jog/shock imposed on said container, and g) impending expiry of viability of said product.

[Claim 33] A receptacle as set forth in Claim 32, said indicator element being operable to provide a signal selected from visible light and audible sound. ,

[Claim 34] A receptacle as set forth in Claim 33, said indicator element being an LCD display.

[Claim 35] A receptacle as set forth in Claim 33, said indicator element being a blinking lamp.

[Claim 36] A receptacle as set forth in Claim 19, said receptacle comprising a pallet operable to hold a plurality of containers as set forth in Claim 23, 25, or 29, said antenna having a dimension thereof that is substantially as large as a maximum dimension of said pallet.

[Claim 37] A method of tracking the conditions of products, each said condition being selected from temperature, product enclosure (shrink-wrapping), light level, product weight, humidity, jog, product age/expiry, and product location (GPS coordinates), said method comprising the steps of :

a) placing each product onto a first receptacle, said first receptacle being provided with a sensor for a said condition and a passive RFID tag operable to emit first wireless signals that indicate a said condition of said product,

b) placing said first receptacle into a second receptacle, said second receptacle being

first signals and to emit second signals, at a wireless frequency not exceeding 15 megahertz, that indicate a said condition of a first or second receptacle,

c) detecting signals selected from said first signals and said second signals.

[Claim 38] A method as set forth in Claim 37, and further comprising the step of :

e) providing a visual or audible indication of a said condition.

[Claim 39] A method as set forth in Claim 37, said first receptacle comprising a first antenna integrated therewith.

[Claim 40] A method as set forth in Claim 39, said second receptacle comprising a second antenna integrated therewith.

[Claim 41] A method of tracking the conditions of products, each said condition being selected from temperature, product enclosure (shrink-wrapping), light level, product weight, humidity, jog, product age/expiry, and product location (GPS coordinates), said method comprising the steps of :

a) integrating a passive RFID tag with a product, said passive RFID tag comprising a product antenna integrated into said product, said RFID tag being operable to emit wireless RF identification (ID) signals operable to identify said product in response to a wireless RF interrogation signal;

b) placing said product onto a first receptacle, said first receptacle being provided with a sensor for a said condition and an active RFID tag operable to emit said RF interrogation signal, to receive said ID signals, and to emit first RF signals operable to identify said product and to indicate a said condition at said first receptacle,

c) placing said first receptacle into a second receptacle, said second receptacle being provided with a sensor for a said condition and an active RFID tag operable to receive said

first signals and to emit second RF signals that indicate a said condition at one of said first and second receptacles,

d) detecting auditable signals selected from said first RF signals and said second RF signals

e) transmitting auditable signals (e.g. by cable or by high frequency RF) detected at step (d) to a central station for auditable recording thereat (e.g. on a write-once-only CD).

[Claim 42] A method as set forth in Claim 41, and further comprising the step of :

e) providing a visual (e.g. on an LCD display) or audible (e.g. an alarm bell) indication of a said condition.

[Claim 43] A method as set forth in Claim 41, said first receptacle comprising a first antenna integrated therewith.

[Claim 44] A method as set forth in Claim 43, said second receptacle comprising a second antenna integrated therewith.

[Claim 45] A method as set forth in Claim 37 or Claim 41, said RF signals having a frequency not exceeding 1 megahertz.

[Claim 46] A system of tracking the conditions of products, each said condition being selected from temperature, product enclosure (shrink-wrapping), light level, product weight, humidity, jog, product age/expiry, and product location (GPS coordinates), said system comprising:

a) a passive RFID tag integrated with a said product, said passive RFID tag comprising a product antenna integrated into said product, said RFID tag being operable to emit wireless RF identification (ID) signals operable to identify said product in response to a wireless RF interrogation signal;

b) a first receptacle operable to hold said product, said first receptacle being provided with a sensor for a said condition and an active RFID tag operable to emit said RF interrogation

signal, to receive said ID signals, and to emit first RF signals operable to identify said product and to indicate a said condition at said first receptacle,

c) a second receptacle operable to hold said first receptacle, said second receptacle being provided with a sensor for a said condition and an active RFID tag operable to receive said first signals and to emit second RF signals that indicate a said condition at one of said first and second receptacles,

d) a field antenna operable to detect auditable signals selected from said first RF signals and said second RF signals

e) a transmitter operable to transmit auditable signals (e.g. by cable or by high frequency RF) detected at step (d) to a central station (e.g. via a satellite) for auditable recording thereof (e.g. on a write-once-only CD).

[Claim 47] A method as set forth in Claim 46, said system further comprising:

e) an indicator operable to providing a visual (e.g. on an LCD display) or audible (e.g. an alarm bell) indication of a said condition.

[Claim 48] A method as set forth in Claim 46, said first receptacle comprising a first antenna integrated therewith.

[Claim 49] A system as set forth in Claim 48, said second receptacle comprising a second antenna integrated therewith.

[Claim 50] A system as set forth in Claim 49, said RF signals having a frequency not exceeding 15 megahertz.

[Claim 51] A system as set forth in Claim 49, said first receptacle comprising a stackable box, said second receptacle being selected from a pallet, a ULD Unit Load Device), and a warehouse shelving unit.